

Claims

1. Pressure measurement device (2) provided with a pressure sensor (6) adapted to perform pressure measurements in the left ventricle of a heart (8), the pressure sensor (6) is connected to a measurement unit (10) to receive pressure measurement values obtained from said sensor, and a processing means (12) for determining a set of pressure values, said processing means then determines a set of first order time derivative values determined from the set of pressure values, characterized in that said processing means also calculates a value of a predefined parameter of the set of first order time derivative values during said measurement period, the predefined parameter is the average or median value of the maximum value of the set of first order time derivative values, wherein the pressure measurements are performed during measurement periods using predetermined medical implant settings in a medical implant (20) controlling the application of stimulation pulses at least in the left and right ventricles of the heart, and that the implant setting includes a first time difference  $\Delta t$  being the time between stimulations in the left and right ventricles.
2. Pressure measurement device according to claim 1, characterized in that said device includes a display means (14) for displaying, preferably in real-time, during a measurement period, curves representing the set of pressure values and the set of determined first order time derivative values.
3. Pressure measurement device according to claim 1, characterized in that said device comprises a pressure measurement guidewire (4) at which said pressure sensor is arranged.
4. Pressure measurement device according to claim 1, characterized in that the pressure measurement device is arranged in said medical implant being a heart stimulating device, e.g. a pacemaker, cardioverter or defibrillator, and that said pressure sensor is arranged at a heart electrode lead connected to said heart stimulating device.

5. Pressure measurement device according to claim 1,  
characterized in that said value of the predefined parameter is added to  
a measurement session list of measurement periods.
- 5 6. Pressure measurement device according to claim 5,  
characterized in that each measurement period in the measurement  
session list have different medical implant settings.
7. Pressure measurement device according to claim 1,  
10 characterized in that the pressure measurement is repeated for other  
predefined implant device settings.
8. Pressure measurement device according to claim 1,  
characterized in that an optimal implant device setting is identified as  
15 the setting where the average or median value is maximal.
9. Pressure measurement device according to claim 1,  
characterized in that the setting further includes a second time  
difference  $\Delta 2$  being the time between stimulations in the right atrium and the  
20 right or left ventricle.
10. Pressure measurement device according to claim 1,  
characterized in that the implant device setting is varied during a  
measurement session according to a predefined search pattern.  
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11. Pressure measurement device according to claim 2,  
characterized in that values of the predefined parameter are displayed  
in a three dimensional illustration.
- 30 12. Method for monitoring, determining by measurement and  
calculation and graphically displaying physiological variables related to blood  
pressure, comprising at least following steps:  
a) detecting continuously during a measurement period left ventricular  
pressure of a heart ( $P_{LV}$ ), derived from a guidewire-mounted pressure sensor;

b) transducing said pressure to a processable signal and delivering said processable signal to a processing means being able to process said processable signal;

c) receiving said processable signal;

5 d) calculating the first order time derivative ( $dP_{LV}/dt$ ) of said left ventricular pressure by processing said signal;

e) forming and displaying a set of values representing the pressure ( $P_{LV}$ ) and the first order time derivative of said pressure ( $dP_{LV}/dt$ );

f) calculating the value of a predefined parameter of said set of first  
10 order time derivative values during the measurement period, the predefined parameter is the average or median value of the maximum values of the first order time derivative values, wherein the pressure measurements are performed during measurement periods using predetermined medical implant settings in a medical implant (20) controlling the application of stimulation pulses at least in  
15 the left and right ventricles of the heart, and that the implant setting includes a first time difference  $\Delta t$  being the time between stimulations in the left and right ventricles, and

g) displaying said calculated value in a measurement session list that may include calculated values from other measurement periods.

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13. Method according to claim 12, characterized in that in step f) only parts of the set of first order time derivative values that fulfil certain calculation criteria are included in calculating the value of the predefined parameter, wherein this results in that artefacts and disturbances are  
25 suppressed.

14. Method according to claim 12, characterized in that the method further comprises the step of choosing the implant setting from the measurement session list that fulfils an optimal implant setting criterion.

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15. Method according to claim 14, characterized in that said optimal implant setting criterion is to choose the maximum amplitude of the average values.

16. Method according to claim 12, characterized in that the implant setting further includes a second time difference  $\Delta 2$  being the time between stimulations in the right atrium and the right or left ventricle.

5 17. Method according to claim 12, characterized in that the implant device setting is varied according to a predefined search pattern.

18. Method according to claim 12, characterized in that a measurement period is less than 30 seconds and preferably 10 seconds.

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19. Method according to claim 12, characterized in that a measurement session list that may include calculated values from measurement periods obtained during a measurement session of less than 60 minutes and preferably less than 30 minutes.

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20. A computer program product directly loadable into the internal memory storage of a processing means within a control unit, comprising the software code means for performing the steps of any claims 12-19.

20 21. A computer program product that can be stored on a computer usable medium, comprising readable program for causing a processing means in a control unit to control an execution of the steps of any of the claims 12-19.